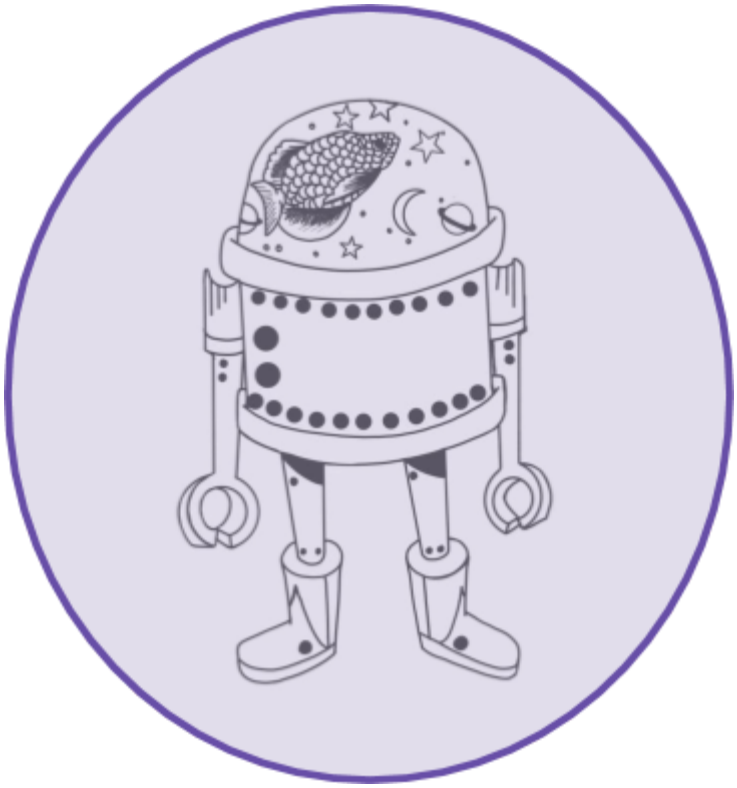
Team 3830 Violet Fusion



Team Summary

2019-2020 Season: FIRST SKYSTONE

FIRST TECH CHALLENGE

SKYSTONE presented by Qualcomm

Team Summary

Hello! We are team 3830 Violet Fusion! We were one of the two new teams created at our school. We overcame a lot this year. One of our biggest challenges was being an all freshman team except for three experienced members. However, this challenge ultimately made us much stronger and closer as a team. We were able to go to the state championships along with all 5 of the teams at PHUHS this year. We were even lucky enough to compete in the finals at the state competition.

Game Strategy

Our game strategy began as we wanted to be an all around general purpose robot, with both stacking and delivering capabilities. The game plan then was to stack and obtain our own blocks. Throughout the league matches we found that we were better at stacking than many other teams (most teams in our league focused on block moving instead), and so we began to specialize in stacking by improving the capacity of the lift as well as having the drivers focus on stacking in practice. As for delivering we had our programmer make us an outaking block function. We did this after watching throughout the competition and realizing that many robots were stealing people blocks if they weren't fully protected by their robot. When we intake a block for delivery we try to completely intake it before out-taking so that no robot can take it while we drive it to our partner. Our longer extension arms also allow us to in a way protect it whilst delivering it directly into another robot's intaking system. This came in handy when partnering with a stacking team.

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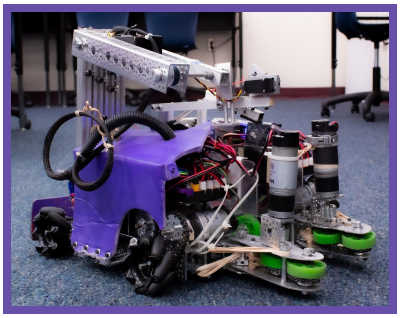

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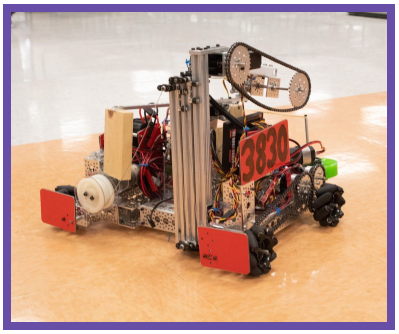

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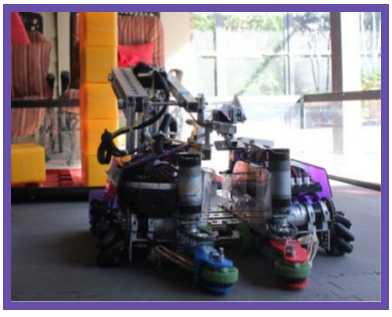
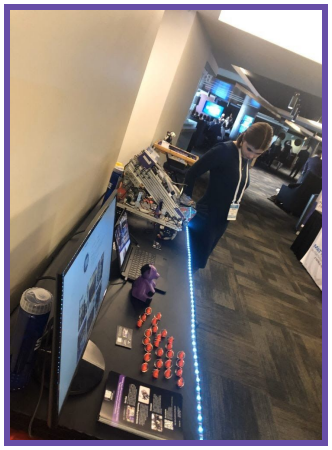


Outreach

To start off we will look into some of the outreach we did this year. We learned very early on that outreach is not as easy as it looks but it very quickly became one of the most fun parts of robotics. We take a lot of pride in not only promoting FIRST through outreach, but also getting people interested in engineering and STEM as a whole. It allowed us to show off what we can do as a way to show other people what they can do. These are some of the highlights this year:

We did a couple big outreach events this year amongst the smaller ones. One of them was at the Dunedin Fine Arts Center. We were able to obtain a booth at one of their family fun nights. Pretty much all ages come to this event monthly. We brought our robot and set up a couple blocks. With the help of one of our drivers kids and parents were allowed to drive the robot whilst we told them how it works. It was really fun to see people impressed and excited about what we built and it was even more exciting to be able to tell them how it works. We did something similar to this with some of our sister teams by attending a Third Friday event in Safety Harbor.

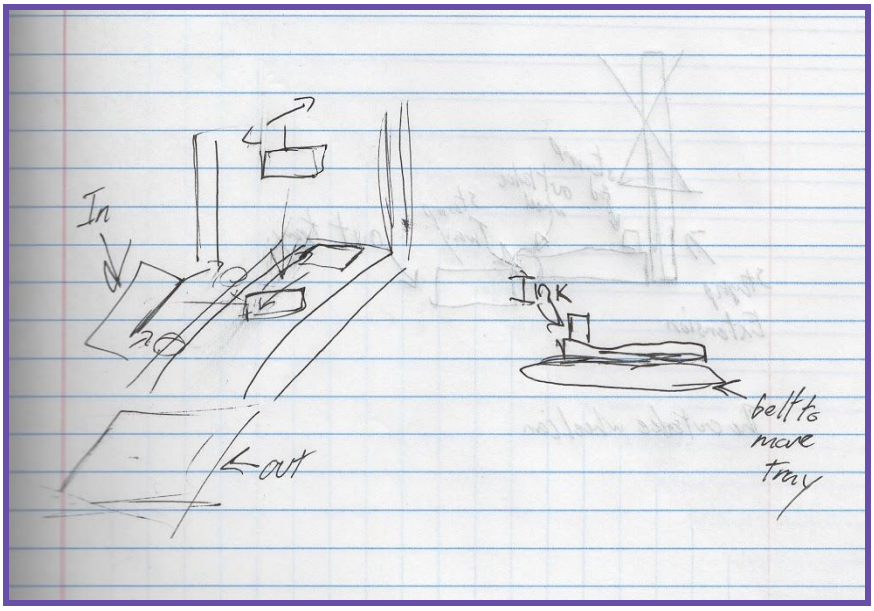
We were able to go to Synapse Summit with our sister team 506. We held a booth in Amalie Arena in Tampa. We talked to many businesses of all sizes and gained a lot of connections and possible sponsorships for the future. We even met somebody from the company ARM, a major sponsor for FTC teams around the world! He was so inspired he gave us his card and made sure we could get into contact with him as for a possible future donation. We also were able to go to talks in the building and we had a member attend the NASA talk which was unbelievably cool.



A smaller outreach event we did was going to Ascend Technology and demonstrating our robot for the founder and owner Jeremy Walton. We brought our robot and similar to The Dunedin Fine Arts center, we set up a mini field and let him, his employee's, and family drive it. We talked about the robot and how it's built and talked about the game. At the end he was generous enough to give us a $250 donation. We certainly are very proud of obtaining this donation for the club and very thankful for his support.

Another one of our most proudest outreach events was a partnership with Harley's Gourmet Popcorn and Cider Shoppe™, a small business in downtown Dunedin. One of their most tedious tasks is hand stamping their bags that hold the popcorn. With their permission we design a machine to stamp their bags for them. This was a way for us to use the knowledge of what we learned in robotics and put it in the real world. We haven't had the opportunity to actually physically build it, but as the future approaches we hope we can bring our design to life for Harley's Gourmet Popcorn and Cider Shoppe™.

One of the sketches of the bag stamper.



Programming

Programming this year provided a lot of challenges because we didn't have any experienced programmers. We had a couple people step up to the plate and with help from surrounding teams and mentors we were able to create a fully working teleop to allowing our robot to perform to the best of its abilities. We also were able to make ourselves an autonomous. We did our best to learn in an efficient and organized way when it came to coding our robot.

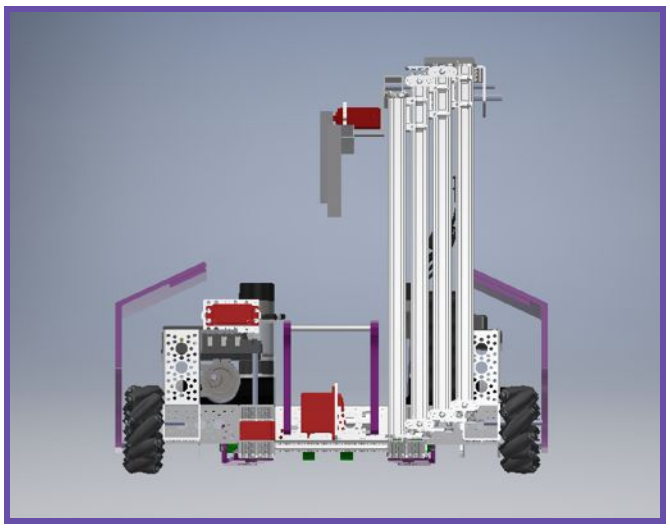
Our TeleOp was a lot different than the autonomous. It required us to identify what functions are to be performed by which button on the two game controllers we had. We decided to have one controller control the driving and the intake while the other controlled the extendable arm and its functions. Both controllers had the ability to control the foundation servo which moves the foundation in the autonomous period as well as end game. In our coding of the TeleOp we created a public hardware class to reduce the amount of errors in the program by having to redefine every single motor and sensor in each new program written. We call it "Hardware StumpyStunpy" in honor of the robot's name. It's basic function is to be a dictionary or reference page that the other programs can call upon. In TeleOp we defined each button and it's functionality such as the joystick on controller #1(controlling the robot's wheels); allowing it to strafe as well as move forward and backward. Each button on the controllers was defined using an "if statement". This gave it an ultimatum causing it to run the code based on its current condition.

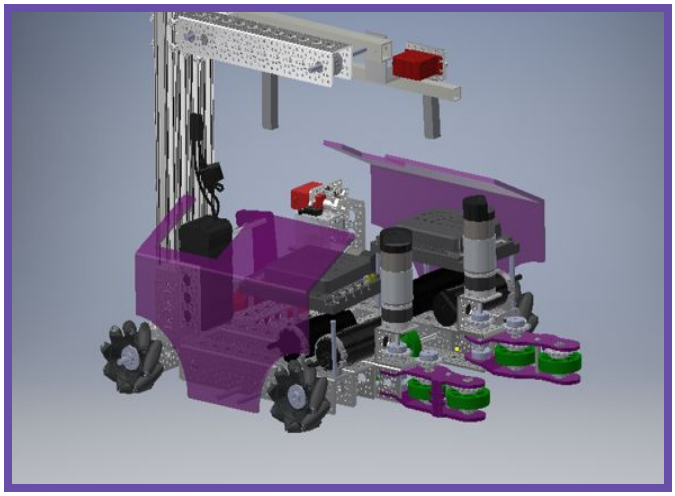
Our auto had four simple actions we chose to focus on from the beginning. We wanted to move the robot to identify a capstone and move it to the other side, we wanted to move the foundation next, stack a few skystones, and park under the bridge. We were able to accomplish most of this, the only thing we hadn't perfected was sampling the blocks. To reduce the amount of time spent debugging, our team executed a state machine and telemetry to identify errors. Due to its process, it makes any other code, except for the one in the case it's running, null. It doesn't read it. With telemetry, we can identify which case it is running on the app to see which part of the code is causing a holdup. It cuts debugging time in half and that extra time can be diverted to more pressing issues such as driving and testing of the programs. For example a case could have a simple task such as rotating 90^0 degrees or have other if and case statements in them to fulfill the action needed to be completed and in combination with telemetry, we could identify which case the program was on, making it easier to debug when code went wrong.

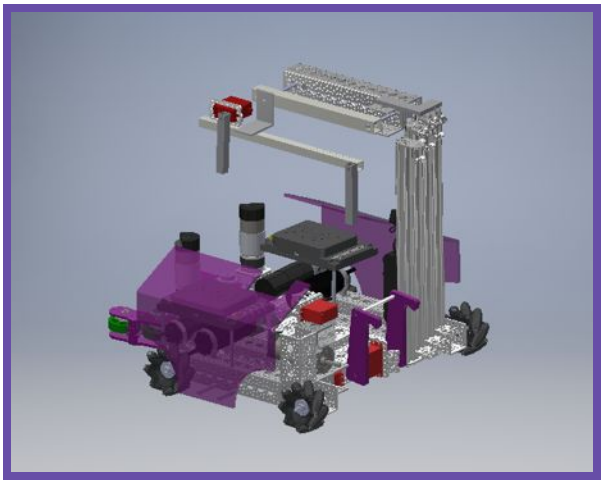
(1) After the foundation auto, all the code below it was designated to be placing the skystones on the foundation during autonomous to better organize the code.
(2) At the start of coding the auto, we had a huge problem with being able to turn to go intake a block, everything seemed fine but we could not enter in negative amounts. Finally we figured out we just had to flip the negative amounts on the motors and we were set we were able to turn and rotate the robot in the correct ways.
(3) After finally being able to turn, we had to intake a block, however, we had to reverse various parts of the intake to go the right way which was an easy fix for the most part.
(4) After intaking the block we had to close the intake to prepare for the next block.
(5) We had done it, a stone had been picked up with only four days until states and all we have to do is drop the block off and grab 2 or 3 more however we didn't get that far and with the state competition days away we had to divert our attention to driver practice and be happy with the suto we were able to accomplish.

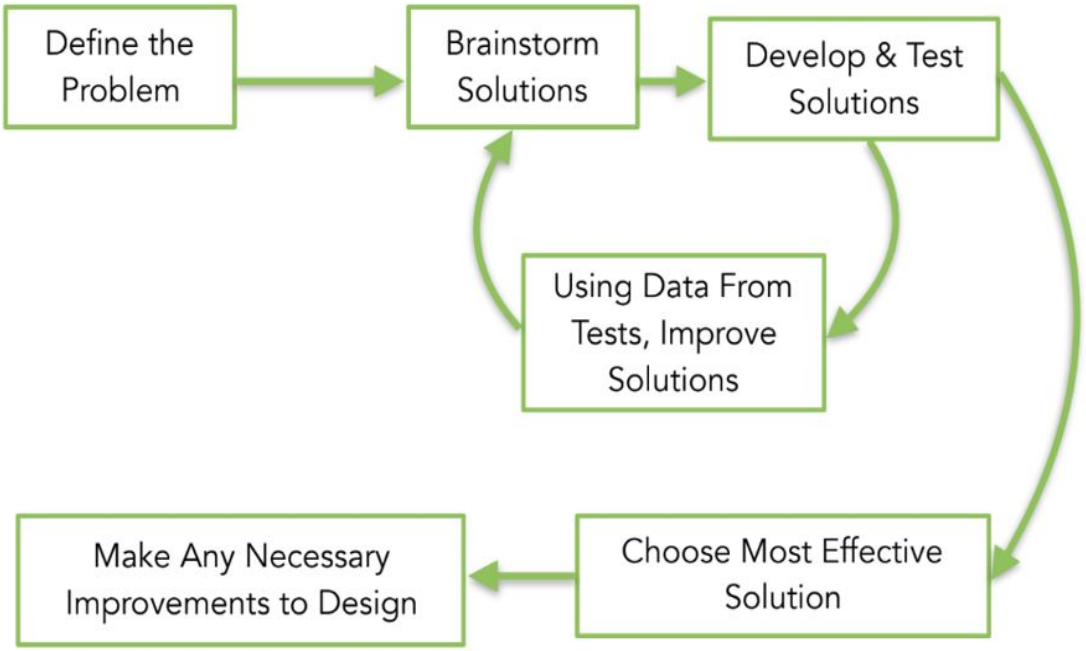
Building Section

After looking through the manuals and the video provided by FIRST, each of the team members shared ideas of the type of robot we are looking forward to competing this year. This included game strategies, assemblies, and major features. We also began the CAD assembly and other junior members were encouraged to contribute more ideas and solutions to various parameters. This was so that we could continue improving upon our design while still in the process of CADing it. We also began the CAD assembly and other junior members were encouraged to contribute more ideas and solutions to various parameters. This was so that we could continue improving upon our design while still in the process of CADing it.









Our ***intake system*** consists of four 2in compliant wheels chained in line in a 3D printed arm. The arms are attached to the robot on a rotating axis. Naturally the arms extend past the 18x18, and so they pack into the size requirements by folding back and latch- ing to the wheels. When the wheels move the latch releases and the intake unpacks to their native position. The arms are tensioned by a set of surgical tubing that is taught pulling them in, and a bundle of surgical tubing that is relaxed holding them out, this means that while constant- lying applying pressure in when opened (by a block), outward pressure is not present, so the block is pinched by the intake arms.

In our ***outtake system*** we have found a way to level the skystone, extend it out, and place it on top of the next skystone all with a single servo. It relies on a belt anchoring the claw to a servo which rotates an arm, which forces the claw to rotate counter to the movement of the arm it is mounted on and stay level with its anchor.

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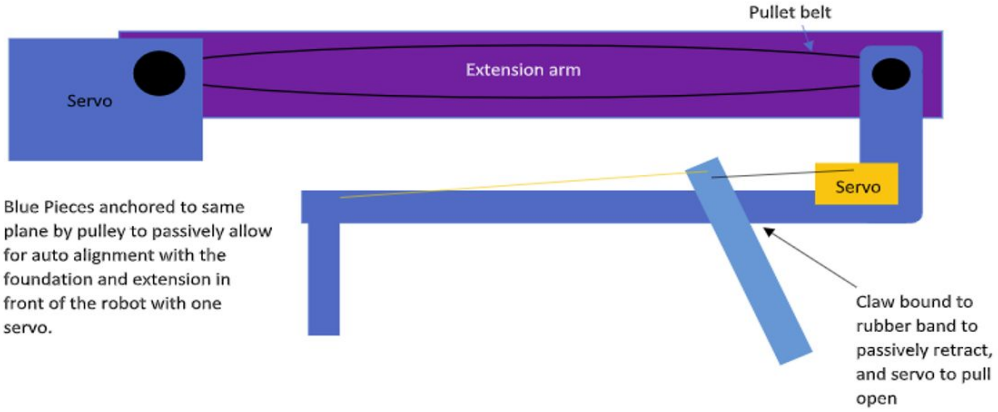
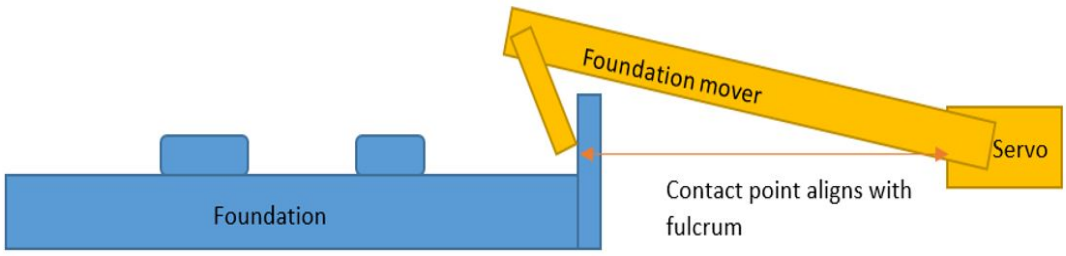


We have a relatively simple ***lift system*** containing a four-stage x-rail gobilda kit as our lift system. It is strung together with 200lb nylon string, and relies on a neverest 20 motor to raise and lower. Sub-Systems.

The foundation mover relies on a servo to force two hooks over the foundation lip. The hooks are shaped that the pivot is in line with the contact point on the foundation. This allows all force to be applied horizontally, leaving no room for vertical slippage.



Personal Experiences

This year because our team was mainly freshman we had some of them write a short summary of what their first year in robotics meant to them.

There are 20 seconds on the clock. We need to get that capstone on the tower, and we'll be the winning alliance. My eyes are glued to the clock. I can't look away even for a second incase I miss the moment. It was too good to be true. Let's go back to beginning. Team 3830 Violet Fusion. New team, new members, and freshman. I was just a freshman. But little did I know that we would advance to states. It was a once-in-a-lifetime experience. As a new member it was my first-time coding in Android Studio for a robot but with guidance from other experienced coders, I was able to learn how to code a robot in under 3 months! Looking back at all the sweat and tears we put into the robot as a team is was a very different feeling than the ones I had previously been on. It was like we created a team member and Violet Fusion wouldn't be complete without it. There are only 5 seconds left and we start to countdown. The referees are watching closely as the alarm goes off and everyone erupts in cheers. We didn't win, but we ran to the field to come together as a new team who had made it this far without much experience. If that's not a win, I don't know what it.

-Aanya Bhandari

This year of robotics was very different from most. But even with the Houston worlds competition being cancelled, robotics was a very fun experience. From start to finish we had lots of challenges and obstacles in our way, but we were able to work together and overcome them. I met new people and got to spend time hanging out with friends through the robotics club. Overall, this year of robotics was an amazing experience for anyone involved!

-Connor Truby

To me robotics was a chance for me to finally really explore and understand what robotics is. I got to work closely with programmers, builders, and other jobs that I didn't think had that much to do with robotics. I learned that as an option for the future, engineering is definitely what I want to do for the future. My favorite days in robotics we're definitely the days I came back home, dirty with sharpie marks, grease on my hands, or my hair absolutely poofed from the heat, because they were the days I got to show something for my work, (that and every other day, including the frustrating ones when our programming wouldn't work or something broke on the robot).

-Angelina Akhnoukh

I am glad I joined robotics this year, even though it was not a complete season, but the experience has given me a lot of happy memories. Through robotics, I received not only the knowledge of building a robot , but friendship as well. This year in robotics gave me a fresh view in areas like CAD, programming and building which I have no previous exposure of. By having this experience, it helped me to determine my future career and major in mechanical engineering.

-Angela Hu

Robotic club means a lot to me, it's like a big family. By joining robotic it made me more determined that I want to learn computer and building. I'm really glad that I joined robotic this year, Throughout the season, I gained further understand of how to make a notebook, CADS, building, programming as well as how to do a better teamwork. We worked as a team, cooperating and encouraging each other.

-Michelle Gao